WHAT IS CLAIMED IS:

1. A lithographic projection apparatus comprising:

a radiation system that provides a projection beam of radiation;

a support structure that supports patterning structure, the patterning structure serving to pattern the projection beam according to a desired pattern;

a substrate table for holding a substrate;

a projection system that projects the patterned beam onto a target portion of the substrate; and

a displacement measuring system that measures the position of a moveable object, said displacement measuring system comprising one of said support struture and said substrate table in at least two degrees of freedom, said displacement measuring system comprising at least one grid grating mounted on said moveable object and at least one sensor head that measures displacements of said grid grating in two degrees of freedom.

2. Apparatus according to claim 1 wherein said displacement measuring system comprises two grid gratings mounted on said moveable object at spaced apart locations and two sensor heads each for measuring displacements of a respective one of said grid gratings.

3. Apparatus according to claim 1 wherein the or each said grid grating is incorporated directly into the main body of said moveable object.

4. Apparatus according to claim 2 wherein the or each said grid grating is incorporated directly into the main body of said moveable object.

5. A lithographic projection apparatus comprising:

a radiation system that provides a projection beam of radiation;

a support structure that supports patterning structure, the patterning structure serving to pattern the projection beam according to a desired pattern;

a substrate table for holding a substrate;

a projection system that projects the patterned beam onto a target portion of the substrate; and

a displacement measuring system that measures the position of a moveable object, said displacement measuring system comprising one of said support struture and said substrate table in at least two degrees of freedom, said displacement measuring system comprising at least one grid grating mounted on a reference frame and at least one sensor head mounted on said moveable object for measuring displacement of said moveable object relative to said grid grating in two degrees of freedom.

6. Apparatus according to claim 1 wherein said moveable object is moveable in a first direction for scan imaging and the or each said grid grating has a length in said first direction greater than or equal to the range of motion of said moveable object in said first direction.

7. Apparatus according to claim 2 wherein said moveable object is moveable in a first direction for scan imaging and the or each said grid grating has a length in said first direction greater than or equal to the range of motion of said moveable object in said first direction.

8. Apparatus according to claim 3 wherein said moveable object is moveable in a first direction for scan imaging and the or each said grid grating has a length in said first direction greater than or equal to the range of motion of said moveable object in said first direction.

9. Apparatus according to claim 4 wherein said moveable object is moveable in a first direction for scan imaging and the or each said grid grating has a length in said first direction greater than or equal to the range of motion of said moveable object in said first direction.

10. Apparatus according to claim 1 wherein the or each said grid grating is positioned so as to be substantially coplanar with the functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table.

11. Apparatus according to claim 2 wherein the or each said grid grating is positioned so as to be substantially coplanar with the functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table.

12. Apparatus according to claim 3 wherein the or each said grid grating is positioned so as to be substantially coplanar with the functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table.

13. Apparatus according to claim 4 wherein the or each said grid grating is positioned so as to be substantially coplanar with the functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table.

14. Apparatus according to claim 5 wherein the or each said grid grating is positioned so as to be substantially coplanar with the functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table.

15. Apparatus according to claim 1, wherein said displacement measuring system further comprises a memory for storing correction information representing differences between the or each grid grating and an ideal grid grating and a data processing means for correcting measurements output by the or each sensor head.

16. Apparatus according to claim 1, wherein said displacement measuring system further comprises one or more capacitive or optical sensors for measuring the position of said moveable object in degrees of freedom not measured by the or each grid grating and sensor head.

17. Apparatus according to claim 1, wherein the or each grid grating includes a reference mark detectable by the respective sensor head for defining a reference position of said moveable object.

18. Apparatus according to claim 1, wherein the or each sensor head comprises an encoder head.

19. Apparatus according to claim 1, wherein said displacement measuring system further comprises an interpolator for interpolating the output of the or each sensor head.

20. Apparatus according to claim 1, wherein the support structure comprises a mask table for holding a mask.

21. Apparatus according to claim 1, wherein the radiation system comprises a radiation source.

22. A device manufacturing method comprising the steps of:

providing a substrate that is at least partially covered by a layer of radiation-sensitive material, said substrate being supported by a substrate table;;

providing a projection beam of radiation using a radiation system;

using patterning structure to endow the projection beam with a pattern in its cross-section, said patterning structure being supported by a support structure;

projecting a patterned beam of radiation onto a target portion of the layer of radiation-sensitive material; and;

measuring displacements of one of said support structure and said substrate table in at least two degrees of freedom using at least one grid grating mounted thereon and at least one sensor head.

23. A device manufactured according to the method of claim 22.

24. A method of calibrating a lithographic projection apparatus comprising the steps of:

providing a reference pattern to patterning structure held in a moveable support structure, said reference pattern having a plurality of reference marks at pre-calibrated positions in at least a scanning direction of the lithographic projection apparatus;

holding an image sensor on a substrate table at a constant position relative to the projection lens;

positioning said support structure so as to project an image of each of said reference marks in turn onto said tranmission image sensor; and

measuring the position of said support structure in at least a first degree of freedom when each of the reference marks is projected onto said image sensor.

25. A method according to claim 24 wherein said image sensor is positioned under the center line of the projection system.

26. A method according to claim 24 wherein the image sensor is positioned at an extreme position of the exposure field of the projection lens.

27. A method according to claim 24 wherein the position of said moveable support structure is measured using at least one grid grating mounted thereon and at least one sensor head.